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Remarks:

Application No. 09/902,828

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U.S. Application No. 09/902,828

Outline of Discussion PointsClaims for Discussion:

A. A carbon foam produced by heating comminuted bituminous coal particles under a non-oxidizing atmosphere to a temperature above about 300°C and under pressure up to about 500 p.s.i. to form carbon foam.

B. A carbon foam comprising:
an open celled structure produced by heating bituminous coal particles under a non-oxidizing atmosphere to a temperature above about 300°C and under pressure up to about 500 p.s.i., wherein the open celled structure defines pores having a size below about 500 μ m, and wherein the open celled structure has a density from about 0.1 to about 0.8 g/cm³.

C. A method for making carbon foam comprising the step of heating bituminous coal particles in a mold under a non-oxidizing atmosphere and under pressure up to about 500 p.s.i. in the mold such that the pressure in the mold maintains sufficient pressure to form carbon foam.

Points of Invention:

1. Carbon foam is the product of the invention.
2. Bituminous coal particles are used as the starting material for forming carbon foam.
3. Heat is applied to the particles under a pressure up to about 500 p.s.i. and under a non-oxidizing atmosphere to form a carbon foam body.

Some Characteristics: High strength, low density
Low thermal conductivity for green foam
Ash content
Very inexpensive to make

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Cited References:

Harnett: petroleum coke particles (from a coker) are placed in a container and heated to temperatures above 600°C under substantially no pressure to form a porous body of agglomerated coke particles where there is a minimum amount of alteration of the pore structure between the particles.

Differences: Does not use bituminous coal particles (uses petroleum coke).
Does not form a carbon foam (forms agglomerated bodies).
Does not heat under pressure (no control of pressure).

Koppelman: Heats bituminous fines at a temperature of at least 750°C and under a pressure of at least 1000 psi to form a solid coke product having a hard honeycomb structure.

Differences: Does not heat at pressures under 500 p.s.i. (above 1000 psi).
Does not form carbon foam (forms honeycomb coke product).

Madley: Makes a briquetting coal by heating low rank high volatile coal particles in oxygen followed by heating to 600 to 900°C then mixing with a caking coal.

Differences: Does not heat in non-oxidizing atmosphere (heat in oxygen).
Does not control pressure (uses fluidized bed reactor).
Does not form foam (produces coal for briquetting).

Kirk-Othmer: Discusses coal caking properties of coal that make a good quality coke. Discuss a test where coal is packed and heated in a crucible to about 800°C.

Differences: Does not control pressure (no pressure).
Does not form a foam (forms coke).

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Other References:

An Information Disclosure Statement is being filed for these references. I will bring courtesy copies of these references with me.

Ball (U.S. Patent No. 3,111,396): Does not use bituminous coal particles
(impregnates a porous organic structure with a suspension to form a metal foam)

Powell et al. (U.S. Patent No. 4,128,401): Does not use bituminous coal particles
(uses solvent refined coal).

Stiller et al. (U.S. Patent No. 5,705,139): Does not use bituminous coal particles
(uses coal extract from NMP).

Stiller et al. (U.S. Patent No. 5,888,469): Does not use bituminous coal particles
(uses a separated asphaltene fraction form foam).